The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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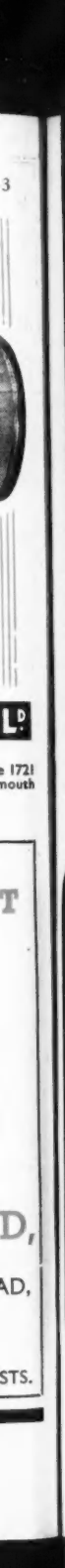

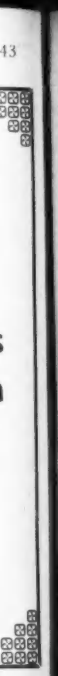

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Problem of Exports

AMID the problems of post-war planning that of our export trade is deservedly taking a high place. There are many things we should like to bring about in this country, such as social improvements generally, and the provision of first quality housing for the whole population, but all of them depend not only on the maintenance of our standard of living, but also upon its improvement. The greater the social amenities provided for people the higher becomes their standard of living and the more money is involved in maintaining it.

There are several well-known reasons why our standards of living may be depressed rather than increased after the war and these possibilities will become actualities if we do not do something about it. Basically, they may be resolved into a reduction in the national purchasing power. If the national purchasing power is reduced there are two things that we can do about it: (1) we can increase our exports, and (2) we can decrease our imports. So far as this country is concerned the *immediate* effect of either of these would be much the same. An increase in exports would put a large number of our people to work and would result in the free flow of international trade. A decrease of imports would not necessarily mean that our immediate standard of living would be reduced, but that we should make use of our resources to maintain those standards of living. Continental economics during the past decade have shown that a country can live by taking in its own washing and can put its people to work by the same method to a surprisingly large extent so long as it does not need to import raw materials from abroad. The skill of the chemist and of the chemical engineer can find substitutes for raw materials, and indeed has found many such substitutes during and before the war. There is thus some reason to believe that economic self-sufficiency would achieve for the time being the desired result.

We should question, however, whether a policy of "economic self-sufficiency" would *permanently* achieve a good result. Few nations are even moderately independent of others for their raw materials, and no nation is completely independent. If all nations were to decide on the adoption of the economic self-sufficiency programme, world trade would soon come to a standstill. The ultimate result would appear to be prosperity for a few years followed by a period of

On Other Pages

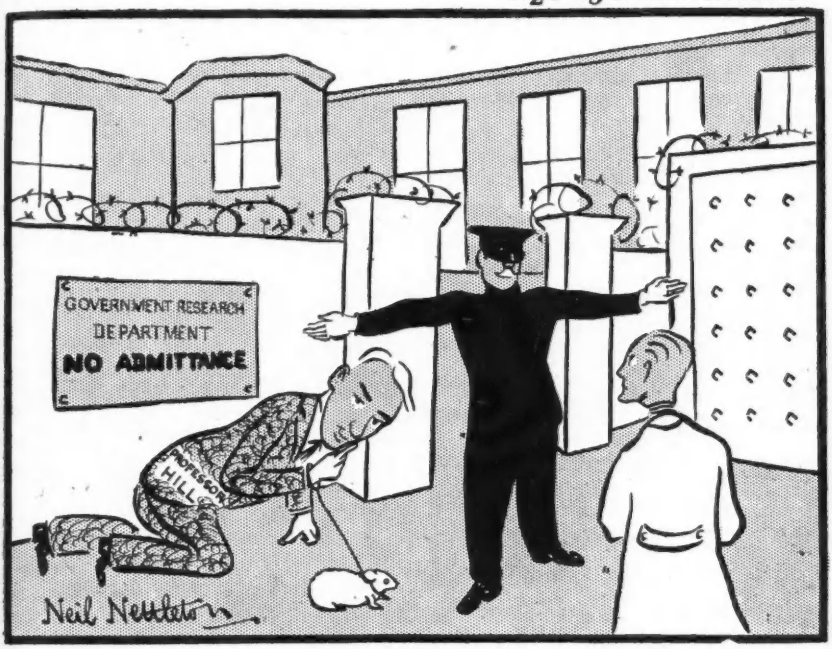
decline which would ultimately land us into the same morass as we were in ten years ago. Whether we shall adopt "self-sufficiency economics" therefore depends on whether the rest of the world will allow itself to be reasonably organised on a basis of free international trade. The provision of substitutes is defensible for two reasons only: (1) the normal material is in short supply for reasons outside our control, and (2) the substitute material is better for certain purposes than the normal material. While in no way suggesting that scientific research should cease to work towards the production of improved synthetic materials —improved in quality or lower in price— we maintain that the sound principle will still be to endeavour to expand our export trade and with it the world's trade.

It has been computed by a recent anonymous writer in *The Times* that the reduction of our income from foreign investments is likely to be of the order of £100,000,000 and that the loss of shipping will for some years to come reduce our net shipping income by another £50,000,000 a year, the two together amounting to 3 per cent. of our pre-war income. The important thing to remember is that although we could soon recover this amount of income by internal trade it means an absolute loss in our trade balance. There was a negative trade ballance before the war of £50,000,000, and, bearing in mind that we are aiming at an improved standard of living, it is reasonable to reckon on a potential adverse balance of £300,000,000. To eliminate this there must be an expansion in the pre-war volume of exports of about 50 per cent. or the provision of substitutes by home production for about one-quarter of the amount of the goods we should otherwise import. The problem, therefore, is to increase our exports by 50 per cent., and not to turn to the alternative of synthetic production at home for reasons of economic self-sufficiency unless the rest of the world refuses to adopt a sound trading organisation.

We have to reflect very carefully on how this expansion of trade is to be obtained. We shall have to consider what it is desirable that we should export and what our customers will desire to purchase. There are certain staple exports such as coal which we shall probably never export again to the extent we have done in the past. Further than this, we are prepared to say that it is undesirable that raw coal should be exported at all, since it is our principal raw material on which practically all our industries depend for their fuel and power. We should strive to export such materials as require a high ratio of labour cost to material cost and which require special skill in their production. Among these are chemicals, chemical plant, and the products of electrical engineering and of automobile engineering. The world still recognises the value of British goods and it has been noted by economists that a prosperous world spends more in buying British goods in proportion as it can afford them.

Another encouraging fact that has been noted is that the prosperity of our customers will depend upon their own productivity and that the exportable surpluses of primary producing countries in foodstuffs and raw materials are likely to be greater than ever before. The fact that many of these countries are themselves undergoing a process of industrialisation seems at first sight to be a stumbling-block in the way of extended exports from this country. It must not be forgotten, however, that as an industrialised community naturally becomes wealthier than an agricultural community its standard of living rises and it becomes ready and willing to buy more goods of high quality from those who can produce them. We do not therefore look on the industrialisation of the world in general with misgivings, but rather as evidence that increased markets will be provided for our manufactures. We have the labour to produce more and we can in fact produce twice the amount of goods for export that we now produce without any reduction in the quantity of goods available for home consumption. There is no doubt that as a long-term policy, no less than as a short-term policy, a great increase in world trade is the key to the solution of most of our post-war problems. Our trade associations are tackling this problem and must continue to tackle it in association with their own export groups. To this end it is necessary that there should be no division between home and export organisations, since their objectives are indivisible.

N_2O by Neil Nettleton



"No, sir, we can't 'ave no co-hoperation in 'ere. It's *much* too 'ush-'ush."

NOTES AND COMMENTS

Works Committees

THE setting up of joint production committees is one of the most interesting developments that the war has brought, and is at least as important to post-war industrial progress as any of the technical advances made since 1939. It was surely the height of understatement for the Minister of Production to say, as he did recently in the House of Commons, "I am sure that in the light of the experience gained their continuance after the war will be given the closest consideration." Joint production committees provide a mechanism whereby the workpeople can be brought into fuller partnership with the management, and it would be a retrograde step to disband them after the war. An encouraging account of the "suggestions committee" at Fort Dunlop—its functions are those of a J.P.C.—was given in a letter in *The Yorkshire Post* recently.

Employees' Suggestions Adopted

MR. W. BOND, the chairman of this committee, wrote that in the last six months probably 50 per cent. of suggestions sent in by employees had been carried into effect. The suggestions come from every grade of worker, and are considered by a special committee composed of representatives of the engineers, the rubberworkers, and the staff. The chairman, secretary, and technical experts are appointed by the management. Suggestions are written and placed in boxes in the different departments. They may be anonymous in case

a man feels that his suggestion is a criticism, but in fact hardly more than 1 per cent. are anonymous. Suggestions deal with a wide range of subjects, among which amenities and well-being, saving of time, economy of materials, ideas regarding plant or processes, avoidance of waste, and safety are prominent. They often give a useful indication of personal initiative and may sometimes point to the need for examination of conditions which seem remote from the suggestion itself. Some suggestions may save money and others may involve expense. There is no fixed scale of awards, but the committee finds it of great encouragement value to allot a substantial number of awards even though the amount per award may not be high. Mr. Bond added that he would welcome the opportunity of giving fuller details to any industrial organisation that may be interested.

Analytical Chemistry

ELSEWHERE in this issue, a correspondent makes a reasoned plea for more generous recognition of the analytical chemist and especially of the fact that his work is no mere humdrum routine, but a highly skilled job requiring very special qualifications. In industry it is probably still too often true that the analyst employed in a works spends his time almost entirely on routine analyses, a matter requiring no more than ordinary care, and certainly not demanding any special scientific qualifications. This sort of analysis, however, is rapidly diminishing in importance in relation to the chemical industry as a whole, and the analyst, properly so called, is coming more and more prominently into the foreground. It is an interesting coincidence that the association which speaks for the majority of analytical chemists in this country—the Society of Public Analysts and Other Analytical Chemists—should at almost the same time have given voice to the feeling that, thanks to "the rapid development of analytical chemistry" some measure of federation of specialised branches of analytical chemistry is due. A meeting of the Society to implement this project has been called for the autumn, and steps have already been taken towards the required end. The omens are favourable—coincidence in matters chemical is seldom purely fortuitous—and this Cinderella in the galaxy of chemical stars will soon, we hope, be awarded a place well fitted to her luminosity.

Italy's Supplies

MUCH of the speculation about the possible results that would follow if Italy came out of the war in the near future suffers from the fact that the perpetual weakness of the Italian link in the Axis chain tends to be overlooked. While it is true that Italy's secession from the war would give us immediate advantages in the field of military strategy, the continuous drain of raw materials and manufactured products from Germany—the price that the Nazis have had to pay to keep the ineffectual armies of Mussolini in the field—would come to an end. For three years now Germany has had to meet Italy's entire requirements of coal and high explosives. Into Italy she has also had to send about 10,000 tons of aluminium a year, about 200,000 tons of iron and steel, and some 300,000 tons of scrap iron. From the European pool Italy has been consuming about a million tons of oil, in addition to her own small synthetic production of about 10,000 tons a month, and the output of Albania.

A Relief to Germany

IN contrast Germany has gained few economic benefits from the alliance. She has had some borax, some bauxite and some zinc. She has been receiving appreciable quantities of sulphur and pyrites, and has depended upon Italy for nearly half of her requirements in mercury. From the supply angle, therefore, though Germany would feel the loss of these Italian contributions—especially the mercury, as Germany is short of the foreign exchange necessary to make good this loss by imports from Spain—the saving that Germany could make if she were relieved of the necessity of meeting Italian demands would far outweigh the consequences of the loss. In particular, that million tons of oil would obviously provide considerable relief. From the military angle, of course, a very different view of the situation is obtained, while Germany would also lose, presumably, the services of about 270,000 Italian workers.

Chemical Seasoning of Timber*

The Use of Urea

THE drying of timber of large cross section has long been a rather difficult matter, since, if deterioration of the timber through "checking" and splitting was to be avoided, the drying operation had to be very cautiously carried out. During the last decade, experimental work in America has shown that the operation of drying large sections of timber need not be quite so difficult as it has been; in other words, the kiln-drying schedules used may be made more drastic if the so-called "chemical seasoning" method is employed. Moreover, it appears to follow that, if "chemical seasoning" is employed, the schedules for drying smaller timbers may be made more drastic also, and the time involved in seasoning thereby considerably reduced.

At the present moment, this is a matter of great national importance. It is therefore highly desirable that the results of the American experiments should be tested and, if confirmed, applied in this country. The following material (compiled with the help of Imperial Chemical Industries, Ltd., who also co-operated in arranging commercial-scale tests) is intended as an outline of the problem, based on American experience and claims; the information given is derived entirely from the American "chemical seasoning" practice, but perhaps these notes will provide a useful basis, at least, for experimental work in Britain, and, it is hoped therefrom to find a rapid method of kiln-drying which can be applied satisfactorily in this country.

"Free" and Hygroscopic Water

Freshly-cut "green" timber contains a large percentage of water, the actual water content varying widely according to the season, the locality, and the species and age of the wood. Thus, while green birch may have an average moisture content of about 47 per cent., there may be a variation in this content in the course of a year from about 24 per cent. to 53 per cent. During open-air seasoning, covering about a year, the green wood gradually loses moisture, and the moisture-content of the seasoned wood, which is practically the same for most species, becomes adjusted to a fairly constant figure—approximately 20 per cent. In other words, the "free" water (about 20-30 per cent.) in the cells of the wood dries out and leaves only the hygroscopic water in the fibres and walls of the cells. The loss of free water in this way causes no change in the dimensions of the wood; there is no shrinkage. On the other hand, the loss of hygroscopic water from the cell walls and fibres causes a marked change in the dimensions of the timber; there is a definite shrinkage, which will continue as long as moisture is being lost.

Cause and Prevention of "Checking"

When "green" timber is dried, free water is first lost at the outer surface; then there is a movement of water in the cells from the inside outwards, so that the moisture dried off from the surface cells is replaced. If drying is slow, as in air seasoning, the moisture content of the surface cells is maintained, by the flow of moisture from the inside, above the limit corresponding to the disappearance of free moisture and the presence only of hygroscopic moisture. There is, therefore, no shrinkage of the timber until all the free moisture has been lost throughout the timber. Thereafter shrinkage is uniform.

If, on the other hand, drying is rapid, and the transfer of moisture from the inner cells to the outer fails to keep pace with the loss of moisture from the outer cells, then all the free moisture will be lost from the outer cells, and loss of the hygroscopic moisture will begin. It has been noted above that the loss of hygroscopic moisture is accompanied by shrinkage. This means that if drying is too rapid, the outer cells will shrink while the inner ones remain the same size. This will set up strains in the timber, and splitting and surface "checking" will result.

In seasoning green wood, the surface inevitably dries more rapidly than the interior; thus, shrinkage starts while the average moisture content of the wood is considerably above the limit corresponding to the hygroscopic moisture. Checking is, therefore, most likely to occur in the initial stages of drying. All woods, on drying, shrink much more around the rings of the tree than radially or across the rings; shrinkage along the length of the tree is very small. This unequal shrinkage tends to cause surface checks and splits, unless the drying operation is well under control.

The above brief discussion shows that the checking of timber might be prevented, or alternatively, that timber might be dried more rapidly without checking, if the surface could be kept from shrinking during drying. This might be done: (1) by keeping free moisture in the surface cells during the entire drying process; (2) by introducing some material into the wood structure that, by virtue of its mechanical action, would prevent shrinkage. A number of

* From the pamphlet "Interim Notes on the Chemical Seasoning of Timber," published by the Timber Development Association, Ltd., 75, Cannon Street, London, E.C.4.

substances are known which will perform one or both of these functions; no chemical reaction between the wood and the chemical used is, however, involved. In using such a chemical, it is sufficient to ensure that the surface cells of the timber are filled with a solution thereof.

The presence of a chemical in the free moisture of the surface cells of the timber has the effect of reducing the vapour pressure of that free moisture. The vapour pressure of the free moisture in the interior cells of the timber remains the same as before, *i.e.*, it is at a higher level. Thus there begins a gradual movement of water from the interior of the timber towards the surface cells, even though the actual quantity of water in the surface cells was originally about the same as that in the interior cells. The quantity of free moisture in the surface cells thus increases, and moisture can be lost more rapidly by evaporation at the surface without quite the same risk of reducing the total moisture content at the surface to a level which would involve shrinkage and consequent "checking." This is the essential factor in the so-called "chemical seasoning" of green timber. The process does not eliminate the ordinary kiln-drying process, but it does materially assist it.

In addition, however, there is another important factor in the physical effect of the chemical itself. When the treated wood is dried, the chemical is deposited in the wood structure and, by its bulk, it opposes the tendency of the wood fibres to shrink. In general, the more soluble the chemical, the greater the quantity deposited in the fibres, and the greater the anti-shrink effect. Timber which has been treated with a suitable chemical will dry at least as rapidly as the untreated timber would at the same temperature in air, and with a relative humidity in equilibrium with the vapour pressure of the water or solution in the wood.

Urea as a Suitable Chemical

The work carried out in the U.S.A. has shown that there are many chemicals which will reduce the surface-checking of certain species of wood, but most of them have undesirable features. The chemical chosen must clearly: (a) be highly soluble in water; (b) be non-corrosive; (c) be stable, and not decompose under normal conditions; (d) be non-toxic; (e) be readily available; (f) be reasonably inexpensive. It should also be sufficiently hygroscopic to retain moisture during the drying process, but not so hygroscopic as to cause the dry wood to become damp under conditions of high humidity.

Of all the chemical substances considered, urea has been proved, in laboratory and full-scale trials in U.S.A., to be the most satisfactory. It has the following advantages: (1) it is very soluble in water; (2) it is not corrosive to metals used with wood; (3) it does not dull woodworking tools; (4) it does not cause the treated timber to become damp after the drying period; (5) it does not promote insect or fungus attack, and inhibits certain rot fungi[2]; (6) it does not discolour wood kiln-dried green from the saw at moderate temperatures, timber appropriately treated or air dried[3]; (7) it is non-poisonous, and harmless to the skin; (8) it is stable, and can be stored without deterioration; (9) it does not affect the glueing characteristics of the wood, nor its natural strength properties; (10) it does not affect paints, varnishes or lacquers normally used on wood, even after prolonged outdoor exposure; (11) its cost is low, and it is inexpensive to apply to wood; (12) it is compatible with most wood preservatives and can be used in conjunction with them, especially water-soluble types such as sodium fluoride, etc.; (13) it does not conduct electricity.

Properties of Urea

Urea— $CO(NH_2)_2$—is a white crystalline solid. It dissolves in water with absorption of a large quantity of heat; the solution is, therefore, cooled, and it may be necessary to heat it if further solution of urea is to be rapid. Solution is accompanied by a marked increase in volume (*see* Table 1).

TABLE I.

Temperature	1 *gal. water dissolves*:	*Resulting volume*	*Specific gravity*
50° F.	8.40 lbs. Urea	1.62 gals.	1.135
60°	9.43 lbs.	1.70 gals.	1.141
70°	10.75 lbs.	1.81 gals.	1.147
80°	12.05 lbs.	1.92 gals.	1.153
90°	13.89 lbs.	2.06 gals.	1.158
100°	15.40 lbs.	2.18 gals.	1.163
110°	17.55 lbs.	2.36 gals.	1.168
120°	19.62 lbs.	2.53 gals.	1.172

To be effective, urea must penentrate and be present in the outer shell of the green timber; the higher the moisture content of the green wood, the more readily will this penetration take place, and it is therefore, essential to apply the urea to the green timber as soon as possible after sawing. The quantity of urea required varies with the species and dimensions and the way in which the timber is converted. For hardwoods less than 2 in. thick, and softwoods not thicker than 6 in., 40 lb. to 60 lb. of urea per 1000 sq. ft. of face of timber is usually sufficient to keep "checking" and similar defects at a minimum. On thick timber, and on boxed-heart pieces, somewhat greater quantities of urea may be required.

There are four general methods by which urea may be applied to green timber boards and baulks.

(1) *Dry-Spreading Method.* If the moisture content of the timber is low, it may be

necessary to wet the wood thoroughly before spreading the urea. The solid crystal urea is then spread on one face of the wet green timber, a heavier application being given at the ends of the boards and along flat-sawn surfaces where checking is most likely to occur. The flat-grained green board should be placed with the sap side up, and urea applied to that face.

After applying the urea, the timber is bulk-piled for one day per inch of thickness before stacking for drying. Bulk-piling has been found necessary for species in which the green moisture content is low, in order to get the urea to dissolve in the water in the wood and to treat the under-surface of the boards. For species with high moisture content, freshly cut, bulk-piling may be omitted, since the urea dissolves during piling in stick and the preliminary steaming in the kiln.

(2) *Soaking Method.* The green timber may be soaked in a saturated or nearly saturated solution of urea in water for a period of time which is dependent on the species of the wood and its dimensions.

(3) *Dipping Method.* The green timber may be dipped for 5-15 seconds in a saturated solution of urea. For rough timber, 2 in. thick or less, a solution saturated at room temperature (and, therefore, containing about 10 lb. of urea to every gallon of water, or 5¾ lb. of urea to every gallon of solution) has been found to apply about 40 lb. of urea per 1000 sq. ft. of face in a 10-second dip. It has been noted above that the desired application is 40-60 lb. of urea per 1000 sq. ft. of face. For timber thicker than 2 in., it may be necessary to use more concentrated solutions, obtained by saturating the solution at a higher temperature than normal in order to apply 40 lb. or more of urea per 1000 sq. ft. of face.

(4) *Spraying Method.* The spraying method involves spraying the green timber with a saturated solution of urea. It can be used to treat large sizes such as poles. The equipment consists of a relatively low-capacity pump, and a trough placed under the wood to return excess urea solution to the tank. The spray nozzle may be made from a length of 1-in. pipe closed at one end and drilled with a series of small holes along one side. Where suitable, the spray method may be used for applying urea to wood stacked with stickers. Urea may also be applied, as saturated solution, to the surface of the timber by means of a brush.

Drying Schedules

Drying schedules for timber treated with urea will vary according to the type of kiln in use, and according to local conditions. Hardwoods have a greater tendency to check and honeycomb than have softwoods; they present, therefore, a more difficult problem in drying. The most satisfactory way of treating hardwoods, is to apply the urea to the green wood, pile the timber with stickers, and place it in the kiln without intermediate air-drying. The initial conditions in the kiln should be above 82 per cent. relative humidity and about 110°F. For heavy timber, the initial relative humidity should be above 86 per cent. This high humidity is maintained until the moisture content of the wood is reduced to about 40 per cent. of its dry weight. The period will depend on the original moisture content, density, and dimensions of the wood. The subsequent kiln schedule can be much more severe than for untreated green timber, and very low relative humidities are safer.

The method preferred for applying urea to green oak is the soaking method. The green timber is submerged in a saturated solution of urea for 2-4 days per inch of thickness, depending on the species and dimensions of the wood. For oak less than 2 in. thick, urea may be applied by dipping the rough-sawn green wood in solutions of urea which are saturated at ordinary or higher temperatures. The amount of urea employed is 40-60 lb. per 1000 sq. ft. of face for oak less than 2 in. in thickness, and about 100 lb. per 1000 sq. ft. of face for wood of 2 in. thickness or over. No entirely satisfactory method has yet been developed for materially reducing checking and/or splitting of oak of large dimensions under air-drying conditions.

Treating Softwoods

The American work has shown that chemical seasoning with urea is readily applicable to high-grade Southern yellow pines, and permits drying schedules as much as 50 per cent. shorter than those now in commercial use. In the kiln-drying of pine, it is the practice to load timber of varying dimensions and to apply the same schedule to all dimensions. Thus, the thicker timber may come out of the kiln with a higher moisture content than the thinner. The practice of loading pine irrespective of dimensions may also be followed when urea is used. The schedule may be made more severe when urea is used, so that the time of drying may be appreciably shortened, or the wood dried to a lower moisture content in the same or less time. With urea-treated pine, the initial conditions in the kiln should be about 45-50 per cent. relative humidity and over 150°F. (dry-bulb), preferably about 180°F. for pine 2 in. or less in thickness. Recently, urea has been applied to pine piles such as are used for telephone lines. In this case, the urea is applied at the rate of 60-80 lb. per 1000 sq. ft. of face.

In general, for such softwoods as Douglas fir, Western hemlock, and Sitka spruce, an

initial temperature of 140°F., and a starting relative humidity of about 80 per cent. have given satisfactory results. Final temperatures and humidities depend upon the species, dimensions, type of kiln, and other factors. For smaller sizes, a final temperature of 160°-170°F. has been used, with relative humidity 50-55 per cent. For larger sizes the final temperature may be about 160°F. and the relative humidity 55-70 per cent.

Examples of Tests

The American literature gives a number of examples of results achieved with the urea method of chemical seasoning.

(1) In one test, nine pieces of Douglas fir, 12 in. by 3 in. by 45 ft., seven of which were boxed-heart, were treated with urea and placed in a school-building. No checks developed for eight months. Summer weather caused an open check at one end of a boxed-heart piece, and slight, or hairline checks on the other boxed-heart pieces. Neither of the two side-cut pieces showed checks.

(2) In another test, two lots of 4 in. cypress of the same green grade were selected. One lot was treated with 40 lb. of urea per 1000 sq. ft. of face and the other was left untreated. Both piles were placed in the yards in December, 1939, under similar drying conditions. In September, 1940, the average moisture content of both lots was down to 16 per cent., and they were again graded. The treated stock, after grading, was as originally piled, while the untreated lot had checked sufficiently to lower the grade.

(3) It has been found possible to kiln-dry green white-oak staves (for use in coopérage) without intermediate air seasoning in 2-3 weeks, to 12-14 per cent. moisture content, without checking or honeycombing. The treatment involves a few seconds' dip in a 50 per cent. solution of urea. One pound of urea treats about 25 standard staves.

(4) In connection with the American National Defence Programme, there were demands for large quantities of pontoon timber, in sizes 2½ in. by 12½ in. to 8 in. by 10 in., with moisture not exceeding 19 per cent., and checking limited to not more than four moderate surface checks well-distributed and not more than ¼ in. deep. Mills attempting to produce this material were experiencing 40-60 per cent. loss due to checking. When the urea method was adopted, the loss fell to 1-5 per cent. and the kiln-time was materially shortened.

(5) In using urea in preventing checking in Western red-cedar poles during air-seasoning, the freshly-peeled logs are treated with urea applied by spraying at the rate of 10-14lb. per 1000 sq. ft. of face. A 12 in. dia. pole requires 0.09 to 0.13 lb. of urea per linear foot.

Tentative schedules for the urea-seasoning of timber have been drawn up from the foregoing details, and are given in detail in the original pamphlet, copies of which are obtainable on request from the Timber Development Association, Ltd., 75 Cannon Street, London, E.C.4.

REFERENCES

1 With special acknowledgements to articles by J. F. T. Berliner, *e.g.*, that in *Mechanical Engineering*, March, 1942, 64, pp. 181-86.
2 *Ind. Eng. Chem.*, December, 1942, 34, pp. 1510-1515. Small quantities of urea have little effect; large quantities (*e.g.*, those used in seasoning) inhibit the growth of fungi and reduce decay.
3 Kiln temperatures maintained at over 160°F. tend to darken the wood slightly. Nevertheless, there are American patents, such as U.S.P.413,654, covering the avoidance of darkening in colour by adding to the urea solution a bleaching agent, such as hydrogen peroxide or sodium hypochlorite.

NEW CAMOUFLAGE PAINTS

A dark green paint which prevents penetration of camouflage effects by the infra-red aerial camera has been perfected by Du Pont chemists. Ordinarily a military target, blended into its background by the use of orthodox green paint, would not escape detection by infra-red photography, because the painted surfaces would appear black in contrast to grass and foliage, which reflect infra-red rays whereas painted surfaces do not. Now the camoufleur can obtain green paints which match natural greens not only visibly but photographically. The range of paints that are proof against infra-red includes olive drab, loam black, earth red, and brown and yellow.

PETROL FROM COAL—NEW METHOD?

The Berlin correspondent of *Aftonbladet* reports that as the result of a new method which has been invented in the laboratories of I. G. Farbenindustrie the former slow and complicated method of obtaining petrol from coal will in future be avoided. The firm's chief research chemist, Professor Krauch, calls the new method a great revolution in the sphere of petrol supply and says: "I shall build no more petrol factories. They will not be necessary. Petrol will be produced direct from coal by the motor vehicle itself. The driver need have no special knowledge. A course lasting a few hours is enough to make him his own fuel manufacturer."

The new fuel is said to be ten times cheaper than ordinary petrol obtained from coal. I.G. is already at work on the new apparatus. Further details have been published in the German Press, but Swedish scientific circles are sceptical about the claims made for the new method.

Parliamentary Topics

Anglo-Soviet Trading

In the House of Commons last week Sir Irving Albery asked the President of the Board of Trade what progress had been made in the formation of the Anglo-Soviet Co-operative Trading Association. Mr. Dalton replied that he did not know, but he had informed the promoters of this scheme that he could not give it his support. Further, since the promoters saw fit, without permission, to mention a number of Government departments in their circular, he had indicated to them that it was their duty to make it quite clear to any persons who might be inclined to subscribe money that His Majesty's Government were not in any way associated with this project.

Export and Branded Goods

To Mr. R. Morgan, who asked the President of the Board of Trade whether he would make it the export trade policy of his Department after the war to give full protection and assistance to all forms of branded goods upon which our international reputation had largely been established, Mr. Dalton replied in the affirmative.

Protection of Trade Marks

Major Procter asked the President of the Board of Trade what steps he was taking to ensure that, after the war, when many firms had been concentrated and the operation of their trade marks suspended, there would be a speedy resumption of the use of such trade marks, as otherwise they might, if not on the market, be prejudicially affected by imitations evolved in competing countries. Mr. Dalton assured his questioner that the trade marks of concentrated firms were fully protected under the Defence Regulations for as long as the concentration continues and for one year afterwards.

Surplus Industrial Equipment

Mr. Craven-Ellis asked the Minister of Supply whether he would consider taking steps to schedule machine tools and other industrial equipment which might be surplus to our post-war requirements, in case they might be usefully shipped to the countries of our Allies under Lend-Lease as they were freed from the enemy, with a view to accelerating the revival of the industrial life of their people and avoiding a state of depression in our home industries.

Mr. Peat: Yes, Sir. This position is under continuous review and the considerations mentioned are not being overlooked.

I.C.I. Staff in Official Posts

In reply to a question from Mr. Boothby, Sir Stafford Cripps gave the information that among senior officers of the Ministry of Aircraft who were formerly employed by I.C.I., Ltd., were Mr. E. M. Fraser, director-general of Aircraft Production, and Mr. R. F. Fisher, one of the ministry's scientific officers. A similar question to the Minister of Agriculture brought the answer that the only person from I.C.I. holding an official post in that department was Sir William Gavin, the Ministry's chief agricultural adviser and liaison officer.

Sandless Glass

Oxides of Zinc and Cadmium Used

THE American Optical Co., Southbridge, Mass., has announced the development of a new type of glass, made without sand. Boric acid, zinc oxide, aluminium hydroxide, and beryllium are the primary batch materials used in manufacture. A second new form of glass also has been made, it is stated, using the same materials, but with cadmium oxide in place of zinc oxide. According to the company, the new glasses will form superior spectacle, camera, and microscope lenses.

Sand, of course, has been the basic material of glass of all kinds from time immemorial, being about two-thirds of all the materials used. In the new glasses, all the substitutes with the exception of boric acid are metals. Two advantages are claimed. One is ability to bend light more than the finest ordinary glass. This is an advantage in forming the curved surfaces, but this extra bending might be a disadvantage, except for the second improvement. That is less separation of the different colours, or wave-lengths of light, as they pass through the glass. The substitution of other chemicals for sand in glass had been going on for about ten years before the new glasses were developed here and in other laboratories.

A new, sandless glass made with tungsten, tantalum, and lanthanum was announced two years ago by the Eastman Kodak Co. and was taken over by American military forces to make improved cameras. One of the interesting, but so far not commercially useful new forms of sandless glass become soft at a little over 150° C. Another sandless glass has recently been announced by the Niagara Alkali Co., New York, and contains compounds of tantalum, tungsten, and lanthanum with boric acid, but no silica. This glass is said to have a refractive index high in relation to its dispersion, imparting an unusual "light-bending" ability and making possible a lens of considerably less curvature for a given focal length. When applied to aerial cameras with compound lenses, this new glass is reported to give better "definition" over a wider area with no loss of lens speed—*Ceramic Age*, June, 1943.

Chemical Co-operation

The Chemical Council's Reply

As a result of the letter signed by some 150 chemists on the subject of chemical co-operation (published in THE CHEMICAL AGE on February 13 last, p. 206), the Chemical Council requested a sub-committee, consisting of the chairman (Dr. L. H. Lampitt), Mr. F. P. Dunn, Dr. H. J. T. Ellingham, Dr. A. E. Everest, and Professor A. Findlay, to consider the correspondence from the three Chartered Bodies regarding the above letter. The Council has now received and approved the report of the sub-committee, in which the matter has been considered under the seven headings set out in the original letter. The sub-committee decided that an amendment to the constitution of the Chemical Council would be required in every instance except in the case of (i) Heading No. 1, where the Council could act only where publications are issued through or by the three constituent bodies; and (ii) Heading No. 5, where publicity could be stimulated only through the bodies forming part of the Chemical Council. In spite of the inevitability of altering its constitution, the Council is pursuing the matter actively, and will formulate a scheme of development for the Chemical Council for consideration in the near future.

New Zinc Process

Methane as Reducing Agent

PAVING the way for the development of large, untouched reserves of domestic zinc ores for use in the war machine, the U.S. Bureau of Mines is establishing a $350,000 pilot plant and laboratory to conduct commercial-scale tests of a gas-reduction process developed by the bureau for production of the zinc. Based on experiments dating back more than ten years, the bureau's process has successfully passed tests conducted on a laboratory-size furnace and has been found superior in several instances to commonly-used commercial methods which require large amounts of electrical energy or coke and coal. The pilot plant will have a daily output of 500 lb. of metallic zinc. Funds for construction of the research plant have been provided in the First Supplemental National Defence Appropriation Act, 1943.

Gas Supply Near Mines

Representing a distinct departure in metallurgical processes for treatment of zinc-bearing ores, the bureau's method uses a natural gas—methane—in several stages of a reducing cycle from which ore concentrate emerges as high-purity zinc. Natural gas frequently occurs near areas rich in zinc-bearing ores, but distant from adequate supplies of electrical energy, coal, or coke. "The bureau believes that the untapped reserves of zinc ores and the abundance of natural gas can be paired successfully into an industrial team which will speed the output of zinc essential to the manufacture of galvanised iron, zinc alloy die castings, brass cartridge cases for guns, batteries, and a multitude of other items," said Dr. Sayers, Director of the Bureau.

Experiments by bureau metallurgists indicate that only 5 cu. ft. of natural gas are necessary to produce 1 lb. of zinc and that as much as 95 per cent. of the zinc can be extracted from the ore by the new process. The amount of fuel required to produce 1 lb. of zinc by the natural gas reduction method is estimated at about half that needed in commercial furnaces using coal and coke. Bureau engineers also believe that the construction cost of commercial-size furnaces using the natural gas reduction process would be much smaller than the outlay for electrolytic zinc plants and would compare favourably with the cost of building other types of metallic zinc plants.

Four principal phases compose the bureau's process. At the outset, zinc concentrate is roasted in a pre-treatment furnace to remove undesirable sulphur. The ore is then placed in a retort; methane is added and the retort is heated with methane burners. Zinc vapour then forms and is condensed to zinc metal. While the laboratory-size furnace used in developing the process generally proved successful, Dr. Sayers explained that many test runs must be conducted with a commercial-size furnace or pilot plant, and that certain adjustments must be expected before a suitable industrial method can be developed.

THE FILDES MEDAL

Announcement has been made of the conditions of competition, for 1943, for the Sir Henry Fildes Medal and Commendation, awarded annually by the Institution of Factory Managers. This year the subject chosen for the competition is an essay on "The Scope of the Factory Manager as the Link between (1) the Inventor, (2) the Skilled Workman, and (3) the General Public." Essays, which should not exceed 5000 words, must reach the Secretary of the Institution—Mr. L. M. Angus-Butterworth, Ashton New Hall, Ashton-on-Mersey, Cheshire—by registered post, before November 30. Provided that the appropriate standard is reached, the medal will be awarded for the best essay in the Senior Group (entrants aged 27 or over on January 1, 1943) and the commendation for the best essay in the Junior Group (entrants under 27). Entries from chemists holding managerial positions in industry will be especially welcomed. Full particulars may be obtained from the secretary at the address given above.

The Analytical Chemist

A Plea for Better Training in the Future

From a Correspondent

AT the 1941 annual general meeting of the Institute of Chemistry, the President, Dr. J. J. Fox, when introducing the new branch of General Analytical Chemistry in the examination for the Fellowship, expressed his surprise and regret that this country lacked a Chair of Analytical Chemistry. Dr. Fox recalled that there had been such a professorship, now discontinued, in this country, and finished with the unpretentious hope that we should soon have one again.

The analyst in this country (and here we are referring to the general analytical chemist, and not to the Public Analyst) has always been in a rather invidious position. In these days of specialisation he has had in some sort to reverse the traditional trend, and know more and more about more and more. The result has been a tendency to regard him as knowing less and less, and to brand him as a Jack of all Trades, with all its implications. But on the principle that *qui s'excuse s'accuse*, the analyst has had to be wary in his self-defence, and so it is rarely that we see any *Apologia Pro Vita Sua* which would help to restore the standing of analytical chemistry.

In the United States

That the position is, to a less degree, similar in the United States of America is clear from reports of the Symposium on the Teaching and Practice of Analytical Chemistry which took place at the Buffalo meeting of the American Chemical Society in September, 1942 (*J. Chem. Educ.*, 1942, *19*, 573 ff.). In his introductory remarks F. B. Vrown pointed out that at only half of the graduate schools which specialise *within* chemistry was it possible to take an advanced degree in analytical chemistry; and that it was rare to find a doctorate in analytical chemistry. He hoped that the increasing support shown to the Division of Analytical and Microchemistry was an indication that such a state of affairs was on the wane. He and several others of the speakers enumerated the qualifications which the analytical chemist must have. On the purely technical side, far from the Jack of all Trades being master of none, he finds necessary " the application of many skills, techniques and theories. Besides the precipitation, washing, ignition and weighing of the old gravimetric analysis, and the making of standard solutions and finding end-points of the old volumetric analysis, the more modern analytical chemist must know how to use microscopes, microbalances, many types of electrical apparatus and vacuum tubes, spectroscopes, polarised light, and X-ray spectra." That is quite a large order to go on with. But that is only the beginning, only the physical apparatus, so to speak. What of the man himself? On that point H. Diehl spoke forcefully: " The prime demands of any quantitative technique are a continued concentration, a high development of resourcefulness and skill, an unyielding personal integrity, and adaptability to blunt contact with the laws of nature. Such discipline is more than many souls can bear." Such discipline is not only severe. It is something to be proud of, something which should give the analyst the unquestioned right to equality in the chemical world. No longer, as S. E. Q. Ashley points out, should the label of the poorer graduate be " Unimaginative, suitable for analytical work !"

No Chemistry without Analysis

So much for the position of the analytical chemist in the hierarchy of chemists. But it is the trained analytical chemist that we have been discussing. What, then, of his training? In the symposium referred to, much stress is laid on the fact that the practice of analytical chemistry does require a special training. If it is possible for a student to specialise in physical chemistry or in organic chemistry, it should also be possible for him to decide that he is going to study analytical chemistry as a branch, not merely as an appendage to the theory of chemistry as a whole, as is too often the case. Such a student (and in fact, all students) should be taught that without analysis there can be no chemistry and that essentially chemistry is only of two kinds, analytical and synthetic. This is a very broad view, but it is in no way too broad. For only in this way can it be stressed that the practice of analytical chemistry requires much the widest basis of any branch of the whole science.

Writing of " Chemists and the Teaching of Chemistry," C. D. Howard (*J. Chem. Educ.*, 1943, *20*, 82) brings out the important point that the analytical chemist is always the investigator, or research worker. He must have the ability " so to conduct an investigation as to find out certain facts needing to be ascertained. That is the art of the analytical chemist. That ability, as I see it, is what distinguishes the true chemist from the mere analyst. It is something

calling for brains, as well as for interest and enthusiasm in one's field. Manifestly, the ability to do this efficiently is something which can only be acquired by experience. Of the new graduate it is scarcely to be expected. What we are entitled to expect of such a graduate is that the capacity for this be in his mental equipment. Without this capacity he should not be graduated."

Certain morals for us in this country may be drawn from these expressed beliefs of American chemists. First, the practice of analytical chemistry should receive the recognition accorded to any other job demanding the highest skill and ability. Secondly, schools of Analytical Chemistry should be founded to follow the lead set by the Institute of Chemistry. In this respect the hope of Dr. Fox for *one* chair in the subject is surely too modest altogether. It would be interesting to speculate on the fate of him who might be rash enough to suggest that one Chair of Physical Chemistry and one Chair of Organic Chemistry could adequately cover the needs of these islands. Thirdly, the schools should be equipped with teachers of analytical chemistry—not merely with chemists who have proved to be misfits in other branches. Many chemists actively dislike the analytical branch, while others eye it with a somewhat fishlike or tepid regard. These are not the prospective staff who will rouse an enthusiasm in the breasts of students. It is only right to ask that the staff should not only have the highest academic qualifications and a strong urge to specialise in the subject, but that they should be able to teach and that they should have some experience in industry of the work for which they are training their *alumni*. The last is as essential as the other qualifications, and it is one that may be considered to mark out this branch from the others.

One cannot hope, of course, that anything worth while can be done to realise this desirable state of affairs as long as the war continues. But after the war the question is one that should deeply engage the minds of all those chemists who try to work for the highest good of their science.

More Alumina from Clay

U.S. Bureau of Mines Report

IN an address at the annual meeting of the American Institute of Mining and Metallurgical Engineers at New York, N.Y., Dr. R. S. Dean, assistant director, Bureau of Mines, Washington, D.C., discussed the programme of the bureau, now in progress, to secure sufficient amounts of alumina through the utilisation of domestic clays, alunite, second-grade bauxite and other alumina-bearing materials. With regard to the use of clays, he said that plans provide for the construction of commercial extraction plants in different localities where suitable domestic clay deposits are available.

In a report to the Secretary of the Interior, urging the utilisation of alunite and clays, the bureau pointed out that even with intensive exploratory work for new bauxite, a milling programme, and the conversion of Bayer plants, the United States still cannot produce sufficient alumina "to place us in a secure position for a long war." The War Production Board recently received a detailed proposal, based in part on research of the bureau, suggesting the construction of a plant to produce alumina from the Hobart Butte clay deposits in Oregon. The bureau has urged that the ammonium sulphate process be used in treating the Hobart Butte ore. Meanwhile, the bureau is continuing its studies of clay deposits in various parts of the country, ascertaining their availability and suitability for the production of alumina by various processes. Suggestions for other plants and other process for known clay deposits are being formulated.

CANADA'S CHEMICALS IN 1942

According to preliminary figures, Canada's production of chemicals and allied products reached a total value of $471,800,000 in 1942, compared with $304,400,000 in 1941, when the previous record was established. The bulk of the increase in 1942 was in special chemicals and explosives, but most other lines also showed substantial gains. Percentage gains by principal industrial groups were as follows: Coal tar distillation, 32; heavy chemicals, 24; compressed gases, 27; fertilisers, 32; medicinals, 16; paints, 13; soaps, 14; toilet preparations, 16; inks, 0.5; adhesives, 23; polishes, 13. There was a decline of six per cent. in the wood distillation industry.

PENICILLIN IN CANADA

In a statement made last month, Dr. T. H. Grey disclosed that penicillin is being produced at the Banting Laboratories, Toronto. He said that the first production in quantity was going to the armed forces, adding that it would be a year before it could be distributed to the medical profession for civilian use. "The laboratories here are obtaining the largest quantities of the agent yet from the mould. Everywhere now they are getting a bigger quantity than at the start. We understand better how to feed the mould to produce more pencillin. Its potency is so great that even in a dilution of one part of the agent to 1,000,000 parts of sterile water, it will kill disease organisms," commented Dr. Grey, who is in charge of penicillin research at the Banting Laboratories.

LETTERS TO THE EDITOR

Talc Control

SIR,—Probably many of your readers who have an interest in this material are unaware of the fight for freedom and liberty that is going on. There is, of course, no objection to the Control itself. The Control has become necessary because many people had been allowed to become importers during the war, so that there was a very great demand for shipping space and currency, and a large quantity of talc was finding its way to trades which the Government considered non-essential.

The Controller invited pre-war importers and those to whom licences had been issued indiscriminately to a meeting and invited them to arrange a scheme for the Control of Imports and Distribution. Some pre-war importers were not invited and only established their claims after protest. Not one merchant distributor was invited. A limited company of importers only is to be formed, and at the expressed wish of the Controller the merchant was to be eliminated. Several merchants in London have been fighting to preserve their right to trade, and, with the assistance of Mr. Norman Bower, M.P., one of the Under-Secretaries of the Ministry of Supply suggested that the merchants should meet the committee of importers. The committee has refused to acknowledge the Under-Secretary in the matter, and the Controller has not made any arrangements for the suggestion to be implemented. The committee, after an unofficial communication from the Controller, has, we understand, made "arrangements" for the distributors. The Controller tells the merchants to obtain a copy of the scheme from the importer and the committee refuses the merchant a copy. It is said, however, that the scheme provides 10s. per ton for the merchant as an "*honorarium*"!!

Mr. Bower is taking further action to obtain fair play and if we may be allowed, we should like to appeal to all people interested, to ask their M.P.s to support Mr. Bower and to let us have their names. All merchants, no matter what their speciality, should take the same action; otherwise, if the present case is allowed to form a precedent, they may be exterminated when their time comes. The time has come for the merchants to form a United Merchants' Association for their own protection.

The merchant business has been part and parcel of British industry for decades, and unless the merchants' old-established rights are definitely confirmed in new controls, they may eventually become non-existent. The Controller of Talc has no doubt passed the death sentence and the present "honorarium" is probably intended as a short reprieve. The merchant is the source of supply of the little man, and if he goes, so will the small manufacturer who is unable to take full truckloads of every material. The fight against concentration and the withdrawal of labour will have been in vain.

It would appear that the source of dissatisfaction as to the way controls are handled lies with the subordinates and not so much with the Ministers who are advised by them. A sorting-out seems necessary.

The paint trade is not now allowed to use french chalk, but we should like to suggest that when any of your readers requires any material which is subject to a licence, he should, in his application, nominate one of his merchant friends as his supplier and so show the Controller that the user also has a right to speak.—Yours faithfully,

For and on behalf of
Wilfrid Smith, Ltd.,
WILFRID SMITH,
Director.,

For and on behalf of
Kittle, White & Co., Ltd.,
E. A. KITTLE,
Director.

August 6, 1943.

The Future of Analytical Chemistry

SIR,—The Council of the Society of Public Analysts and Other Analytical Chemists has had under consideration the desirability of the formation, within the Society, of Groups or Sections dealing with special subjects or branches of analytical chemistry. In considering this question the Council was aware that for some time many members have been concerned with the implications arising from the recent rapid development of analytical chemistry and the probable continuation of such development in the post-war period. It appears to the Council that the need of some measure of federation and co-ordination of specialised branches of analytical chemistry has now arisen and that, since one of the aims with which the Society was established is "to encourage, assist and extend the knowledge and study of analytical chemistry," such need can most properly be met by implementing this objective. The Council has therefore now approved the institution of Groups within the framework of the Society.

Negotiations are already in progress with the Microchemical Club with a view to that body becoming a Microchemical Group of the Society, but the Council wishes to encourage the formation of other Groups also, and proposals to this end will be submitted to a special meeting of the Society, in the autumn.—Yours faithfully,

S. ERNEST MELLING,
President.

L. EYNON,
August 5, 1943. Hon Secretary.

The Trend of War-Time Earnings

Analysis of Company Accounts

by S. HOWARD WITHEY, F.C.I.

AFTER providing for deferred repairs, depreciation, E.P.T., and war damage contribution, the gross earnings of British Glues and Chemicals, Ltd., amounted to £97,906 during the financial year to the end of April last. This compares with £98,577 in 1941-42 and £101,969 in 1940-41, and as the provision for income tax is £4500 higher at £23,000, the balance of net profit is shown at £74,756, representing a decline of £5171 in relation to the previous year's figure, but an increase of £9437 over the 1940-41 result. Registered in 1920, the company specialises in the manufacture of glue, grease, fertilisers, and animal feeding stuffs, etc., the authorised capital being £2,000,000 of which a total of £700,000 has been issued. The capital ranking for dividends consists of £525,000 in the form of 8 per cent. cumulative preference stock which is entitled to a further ½ per cent. for every 2½ per cent. paid on the ordinary above 5 per cent., and £175,000 in ordinary stock, the dividend on which has been maintained at the rate of 10 per cent. Holders of the preference stock, therefore, receive 9 per cent., as before, and after placing £10,000 to general reserve, compared with £15,000 a year ago, the forward balance is slightly higher. The dividends are calculated at the gross amounts, the final figures being made up as follows:—

	£
Brought forward from 1941-42 ...	33,499
Net profit—year ended April 30, 1943	74,756
Disposable balance	£108,255
9 per cent. dividend on £525,000 cum. preference stock, gross ...	47,250
10 per cent. dividend on £175,000 ordinary stock, gross	17,500
Transferred to general reserve ...	10,000
Carried forward to 1943-44 ...	33,505
	£108,255

The consolidated balance sheet of the combine shows fixed assets to the value of £379,958, while the current assets total £883,469, the floating surplus over liabilities being £463,445, compared with £451,444 previously. In 1942, the ordinary stock 4s. units reached 6s. 9d., the lowest price during the year being 5s. 3d. Recently, they were quoted at 8s., giving a return of 5 per cent., and at 34s. the preference £1 units give a return of more than 5½ per cent.

The audited accounts of W. & T. Avery, Ltd., cover the twelve months' operations to March 31, and disclose a trading profit of £189,985 after debiting an unstated amount for taxation. This represents an increase of £7514 in relation to 1941-42 and an increase of £4620 over the 1940-41 figure, and in the circumstances must be regarded as satisfactory. The sum of £41,836 has been provided for depreciation, compared with £42,064 in 1941-42, and after charging £10,000 for directors' fees, as before, the balance of net profit is £138,150, representing an increase of £7743 in relation to the previous year, and an increase of £7489 when compared with the 1940-41 figure. The pensions fund receives a special allocation of £10,000, and the ordinary dividend of 15 per cent. is repeated. This company was registered in 1894, and normally manufactures weighing, testing and counting machines, and is at present engaged on work of national importance. The authorised capital is £1,250,000, of which a total of £1,135,536 has been issued, comprising £134,230 in the form of 5 per cent. "A" preference stock; £147,128 in 5½ per cent. "B" preference stock; and £854,178 in ordinary stock. After allocating £45,000 to the war contingency reserve and £10,000 to the general reserve, the forward balance is £457 smaller, thus:—

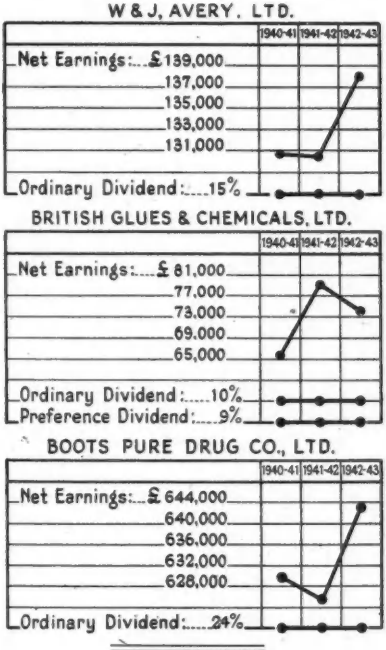
	£
Brought forward from 1941-42 ...	67,275
Net profit—year ended March 31, 1943	138,150
Disposable balance	£205,425
Allocated to pensions fund	10,000
Dividends on pref. stock, less tax	7587
Ordinary dividend, less tax ...	66,020
Allocated to war contingency res.	45,000
Transferred to general reserve ...	10,000
Carried forward to 1943-44	66,818
	£205,425

After deducting depreciation, properties and plant are shown on the balance sheet at £329,651, while investments in and accounts with subsidiaries amount to £671,586. Current assets total £1,707,002, compared with £1,469,901 previously, the floating surplus over current liabilities being £741,117. The "A" preference £1 units yield 4 per cent. at 25s., and the "B" preference return 4.2 per cent. at 26s. 3d. During 1942, the ordinary £1 units reached 79s. 6d., the lowest price during the year being 70s., and recently they were quoted at 81s., on which basis the actual yield works out at 3.7 per cent.

In the case of Boots Pure Drug Co., Ltd., the turnover during the year to March last was the largest on record, both in quantity and value, but the major part of the increase was absorbed by taxation. After providing for taxes, deferred repairs and pensions, the gross earnings amounted to £1,067,462, which figure compares with £1,025,093 for 1941-42, and £1,001,370 for 1940-41. To arrive at the balance of net profit the charges included £183,433 for repairs and renewals; £131,924 for depreciation; £14,905 for A.R.P. expenditure; £88,230 for war risks insurance and directors' fees, the profit of £643,345 comparing with £622,784 realised in the preceding year. The company owns direct controlling interests in several companies, and transacts business at some 1186 retail shops in Great Britain. The capital, of £3,000,000, consists of seven classes of preference shares totalling £1,400,000, the remainder being in ordinary shares of 5s denomination, on which a dividend of 24 per cent. has been maintained. The freehold property reserve receives an allocation of £40,000, and after placing £1516 to the war contingencies and damage reserve the forward balance is £3079 higher.

	£
Brought forward from 1941-42 ...	220,645
Net profit—year ended March 31, 1943	643,345
Disposable balance	£863,990
Allocated to special taxation reserve	150,000
Dividends on preference and preferred ordinary shares	96,750
Dividend of 24 per cent. on ordinary shares	352,000
Transferred to freehold property reserve	40,000
Allocated to war contingencies and damage reserve	1516
Carried forward to 1943-44 ...	223,724
	£863,990

Including £3,483,668 in freehold property, and excluding assets which are the subject of war damage claims, the fixed assets amount to £5,789,036, against which there are reserves totalling 3,067,591, in addition to a works development reserve of £100,000, and the war contingencies and damage reserve of £750,000. The current assets in stocks, debtors and cash, etc., have increased from £2,739,277 to £3,054,141, and the company occupies a high position in chemical research and production. At the recent price of 41s. the ordinary shares yield 3 per cent.



SAFFLOWER OIL

Although safflower oil is of commercial value because of its valuable property of preventing "after-yellowing" of white or pale tinted paints, little work has been done on the chemical constitution of Indian safflower oil. N. L. Vidyarth published the results of recent investigations in the *Journal of the Indian Chemical Society* (1943, *20*, 2, p. 45). According to his figures safflower seeds yield 30.5 per cent. of oil which contains myristic acid (along with lauric and other lower acids: 1.5%), palmitic acid (3%), stearic acid (1%), arachidic acid with a trace of lignoceric acid (0.5%), oleic acid (33%), linoleic acid with a trace of linolenic acid (61%). The glycerides have been determined by the bromination of the neutral oil and the component glycerides have been found to be myristo-oleolinolin (2%), myristo-dilinolin (1%), palmito-oleolinolin (7%), palmito-dilinolin (4%), stearo-oleolinolin (2%), stearo-dilinolin (1%), dioleolinolin (15%), oleo-dilinolin (63%), and trilinolin (3%). The myristo-glycerides contain a little lauric and other lower acids, the stearo-glycerides contain a little arachidic and lignoceric acid, and the trilinolin contains traces of linolenic acid.

Benn Brothers' Annual Meeting

Mr. Robbins's Address : New Director Elected

THE 47th general meeting of Benn Brothers, Limited, proprietors of THE CHEMICAL AGE, was held at Bouverie House, Fleet Street, E.C.4, on August 6, the chairman, Mr. Gordon Robbins, presiding. The chairman moved a resolution approving the report and accounts for the year ended June 30, 1943, and recommended payment of the dividends already reported. Mr. Robbins pointed out that revenue, expenditure, and net profit were all substantially up; increases were recorded under each of the four main heads of the company's revenue, advertisements, sales, rents, and interest on investments.

There was carried to the balance sheet a net profit of £58,552, and it was thought wise to maintain the ordinary dividend at 15 per cent., the peace-time figure for nearly a decade, which was restored in 1942 from the figure of 12 per cent. to which the contraction of business in the first two years of the war had caused it to fall. A large part of the remainder of the surplus had been allocated to the strengthening of the company's reserves. To the taxation reserve started last year a further £14,000 was allocated, the general reserve was increased by £10,000, and the total allocated to reserves was £28,500, with a somewhat higher balance of £15,658 carried forward.

The Present and the Future

"The company's financial position," said Mr. Robbins, "can be regarded as wholly satisfactory. Yet it would be wrong if I did not say that there seems to us to be a certain unreality about the present position. There has not, indeed, been any dangerous inflation, but war controls have so far depressed the spirit of competition together with all enterprise as to make business getting easier at the source than under the healthier conditions of peace. There is something static and, indeed, almost automatic in the advertising position which does not necessarily make the figures for last year a safe guide to prospects when the tight rein of Government regulation on industry and commerce is relaxed at the end of the war. At the same time it is a highly favourable symptom for the company's future that business men should have remained as loyal to the Benn periodicals as they have shown themselves during this highly unsettling period. Whatever befalls when the struggle for business is resumed on an individualistic basis, this company has at least consolidated virtually the whole of its past goodwill and firmly established many new friendships."

For the first time the company had seriously felt the effects of the call-up for national service of women members of the staff. At least a score of fully trained Benn women had cheerfully taken their place in the national front line, and one of them had been posted to the heart of Africa. Gaps on the staff for essential war-time production had been filled at both ends of the age scale, with men well into the forties and beyond and with girls under nineteen, and the strain and responsibility falling upon the experienced seniors had been increased. "In the closing weeks of the fourth year of the most arduous war in history," said Mr. Robbins, "I rejoice to testify that I have never worked with a more loyal and enthusiastic body of men and women. The board is glad to have had the opportunity to make suitable recognition during the year of the special effort made by every single member of the staff. Still, to my mind, we should acknowledge no greater debt than that owed to those gallan members of the staff, now approaching a hundred in all, who are giving different forms of national service. It seemed to the board that there could be no more fitting gesture of appreciation than that a serving member of the staff should be nominated to one of the vacancies on the board. A little later a resolution will be moved for the election, as a director, of Commander Arthur Owen Gillett, and I cannot doubt but that you will receive it with acclamation."

The Strain of "Carrying On"

Mr. Norman French, in seconding the resolution, said that while in one way the advertising business had been static, in another it had been rather fluid as all had been engaged in trying to squeeze a quart into a pint pot. The reduction of the Benn trade journals to war-time size had broadened their service and brought in many new friends. Sir Ernest Benn, speaking in support, said he saw from the accounts that the amount which this delightful State of ours took was twice as much as the proprietors would ever take. The chairman had very properly paid tribute to the service of those of the staff engaged in public work. What impressed him in domestic, local, and business affairs was the tremendous and unprecedented strain which had been put on those who were carrying on with day-to-day life with absolutely no recognition. He took off his hat most heartily to all concerned in Bouverie House. The resolution was then carried unanimously.

Chemicals in South Africa

Smaller Firms Remedying War-Time Import Losses

(From our Cape Town Correspondent)

WHILE many of the more important chemical plants in South Africa are engaged in official work such as the production of explosives and other chemicals to aid the South African war effort, there has been much more activity among the smaller firms in the preparation of various chemical products to take the place of those which can no longer be imported from Great Britain or the United States. At the same time South African importers are looking more and more to the Argentine and Brazil as possible sources of certain chemical preparations that cannot as yet be produced in South Africa and that cannot at present be imported from Britain or America. Most of the recent developments in South Africa have been in the line of toilet goods like deodorants, which the newcomers to this market are selling in South Africa under various branded names. These goods are accepted as war-time makeshifts, but it is doubtful, unless the price comes down and the quality goes up, whether they will retain much trade in the local market once the era of free competition returns again.

Stove polish (made in 1½ oz. cubes), furniture cream, and teak oil are included in the new lines of a Johannesburg firm specialising in household products. The manufacturers are employing chemists regularly to test the raw materials and to ensure uniformity and quality. All the raw materials used are stated to be of South African origin.

Sodium Chemicals, a Johannesburg firm, recently extended their plant for the production of sodium sulphate. When in full production an output of approximately 100 tons a month will be attained. After completing the initial plans, this firm installed a new furnace to increase the sodium sulphide output, and plans for further increases were under consideration. There has also been an increase in the silicate of soda output.

Chrome Chemicals

A factory was recently erected for the production of various heavy chrome chemicals, of which the principal products are: bichromate of soda, chrome tanning salt, chrome oxide green and lead chromate pigments. The last named are being made for the paint manufacturing industry, and local paint manufacturers are said to approve the quality of the product. The raw materials needed for the manufacture of the chrome compounds are, with one exception, produced in Southern Africa, and all the items of plant and equipment, excluding electric motors, were designed and built in the Union mainly from South African materials. All stages of production are laboratory-controlled, the factory having a well-equipped laboratory with qualified chemists in charge. These products, which were imported before the war and have been unobtainable from overseas for a long time, are used by other manufacturers for the manufacture of war supplies and for essential civilian requirements. It is hoped that after the war the new industry will be able to compete with overseas manufactures, at least in the South African market.

A Durban firm has started building a factory at Underberg where they will manufacture lactose milk sugar, together with other by-products.

Sulphuric Acid Production

In the Belgian Congo the chemical industry, founded in pre-war days to serve local needs, has been on a war footing since 1940. The industry comprises several factories, among them a sulphuric acid factory, a fatty-acid and glycerine factory, and others for the various sulphates and chlorates. Copper is treated with sulphuric acid, and annually 20,000 tons of sulphuric acid are produced, part of it going to the Rhodesian mining industry. The sulphur dioxide needed for sulphuric acid production is obtained by roasting zinc concentrates which are then exported to America. From this roasting, 44 tons of cadmium are retrieved, which is very useful to war industries. The chlorate factory produces 800 to 900 tons of sodium chlorate a year; a portion of its output is used in the Congo to make explosives, and the balance is sold to a South African match factory.

Graphite, found in the Northern Transvaal, is being used in the local munitions production. Previously South Africa imported all the graphite it needed from overseas, but as this has ceased to be available, it is satisfactory to know that the South African production is now well in hand. Some time ago it was announced that 200 tons of Transvaal graphite were to be produced monthly for use in local industries. In Johannesburg it is being mixed with lubricating oil for treating machinery bearings.

Last year it was reported that bauxite had been discovered near Nelspruit, in the Transvaal, but this does not seem to have been confirmed. If it is, this will be the first recorded occurrence of bauxite in South Africa.

Now that the United Nations are well

established in North Africa it is hoped in the Union that phosphates from French Morocco will again be available, but it is realised that the shipping problem is a difficult one. Local resources of phosphates are being worked more keenly. A phosphate mine in the Cape has been estimated to offer a potential yield of a million tons. This product is being used for making both explosives and fertilisers.

A new South African enamelling process is claimed to have been discovered in which vermiculite mined in the Transvaal is used. This enamel is stated to be three times more durable than the ordinary kind, and due to a coloration imparted by the vermiculite, it appears that this new enamel can be obtained in a very large variety of pastel shades.

Home-produced Salt

South Africa seems now to be faced with a serious shortage of salt for domestic purposes, as no British salt is now being imported and the local production does not seem to be keeping pace with the demand. Salt is not mined in South Africa but is recovered from the brine which is pumped from shallow pans, or pits, and boreholes in the pan floor. As the pans occur in the more arid districts, the bulk of the salt is obtained during the dry months by solar evaporation in shallow dams—artificial heat is used only by a few producers. Under careful supervision the quality of the salt can equal the imported article, but occasionally dust storms contaminate the salt, necessitating grading. The lack of standardisation of the various grades of salt is considered an obstacle still to be overcome by the industry. Since the Chamber of Salt Producers formed a national federation there has been a more determined attempt to place the industry on a better basis, increasing the sales of South African salt by ensuring that better methods of preparation improve its quality. In spite of this many of the salt pans are still operated inefficiently, and even though the war has brought a better market for their products, these will have to be improved if they are to retain the trade. The better type of producer is selling to the domestic market and to certain industries. The production of salt from sea water or natural brine involves the process of fractional crystallisation and the purity of the resultant product is dependent upon the care with which this is carried out. The importance of salt texture after refining is being emphasised, together with the fact that in crystallisation the size and form of the crystals will depend upon the temperature, rate of evaporation and concentration of the liquid. Normally, imports represent only about 7 per cent. of the value of the Union's salt consumption.

Scotland's Industries

Development of New Coal Resources

SCOTLAND'S new industrial map, the work of the commission appointed by the Secretary of State for Scotland to inquire into the future development of the country's coalfields will, when it is completed, foreshadow the biggest industrial transformation ever planned for Britain. The changes envisaged will involve the expenditure of millions of pounds, and will affect the lives of hundreds of thousands of workers. The map is to be submitted to the Government shortly. One of the chief findings of the commission will be that the South-East of Scotland has a potential coal output of 30,000,000 tons a year for at least 200 years.

Mining engineers and surveyors have reported that valuable seams of coal of unusual thickness exist in the Lothians, Fife, and Clackmannan. In the Lothians the untapped coalfield extends more or less from Newtongrange to North Berwick. The richest seams, however, are situated in East Fife and Clackmannan, stretching from Leven to many miles below the Firth of Forth.

Mr. Arthur Woodburn, M.P., Under-Secretary of State for Scotland, has stated that the switch-over of the coalfields from the West to the East of Scotland is inevitable, and will mean a new era of industrial prosperity for South-East Scotland

SILICA GEL FOR AIRCRAFT

Silica gel is being used to prevent corrosion of aircraft and other engines during transit to a theatre of war. The sparking plugs are removed from the cylinder cases of engines, and replaced by transparent plastic containers filled with silica gel. Also enclosed within each shipping container is a humidity indicator which tells whether the silica gel is doing its job. Silica gel crystals impregnated with cobalt chloride are placed in a transparent envelope mounted on a card. This envelope can be seen through a transparent cellulose acetate window in the container, so that inspection can be made without the necessity of unpackaging the machine. When the relative humidity is less than 20 per cent., the crystals appear dark blue; between 20 and 30 per cent. they take on a pinkish tinge; and should the indicator show that the humidity is higher than 40 per cent., the silica gel has reached its adsorption capacity and should be replaced.

Patents Up to Date

Some Useful Present-Day Hints

by F. J. TEBBUTT

WITH differences in procedure due to war-time Acts, Rules, and Orders, it has been thought that a few hints on securing protection for an invention (this term means "any manner of new manufacture") by letters patent may be useful. An application (to the Patent Office) must be accompanied by either a "provisional" (two copies) or a "complete" specification (two copies). If a "provisional" one is sent, the "complete" specification must be sent within twelve months (thirteen months if extension of time is applied for); if the "complete" specification is not forthcoming within these time limits, it is considered that the application has been abandoned. The true and first inventor can apply either alone or jointly with any other person. A company cannot be the sole applicant, unless the invention is one from abroad, but it can be a joint applicant with the inventor; a firm as such cannot apply: all the partners must be named and each one must sign the application.

When the "complete" specification is received an examiner looks into the application to see whether the Acts and Rules have been observed (until recently this applied on the receipt of a "provisional" specification) and an investigation is made as to the novelty of the invention and so forth. If the "complete" specification is accepted, this fact is advertised in the Official Journal (Patents), the "complete" and "provisional" specifications become open to public inspection, and copies are purchasable. Objections can be entered but if no such action is taken within two months a patent is granted.

The Cost of Official Forms

Official forms must be used throughout the various stages, these being obtainable from any Money Order Office, from the Inland Revenue Office (Patent Office) by personal application (not by post), or from the Controller of Stamps, Bush House, London, W.C.2, by post or otherwise. Application forms cost £1, "provisional" specification forms are free, "complete" specification forms cost £4 (duplicates free); forms for extension of time for presenting "complete" specification forms cost £4 (duplicates free); forms for extension of time for presenting "complete" specification £2. On grant of patent the sealing fee is £1 and renewal fees are payable afterwards, the first (£5) being payable before the end of the fourth year from the date of the patent; then for every succeeding year the fees are progressively increased up to £16 for the last year; a patent ordinarily remains alive for sixteen years.

The "provisional" specification need not be given in minute detail, although it should contain sufficient information to describe the nature of the invention adequately; if not, the patent may be post-dated to the date when the necessary information arrives. For the "complete" specification, however, details should be given (so that everything of importance is protected), the information provided being such that a competent workman could bring the invention into practical effect from the directions given. Specifications are preferred typed or printed, but duplicates may be carbon copies if the typing is black and distinct, and if good white paper is used. Drawings (not obligatory with the provisional specification unless an adequate description cannot be given without) with the "complete" specification should be provided where considered necessary for a clear understanding of the invention; they should be on pure white drawing paper 13 in. by 8 in. (or 8¼ in.) and absolutely black ink must be used (ordinary writing ink is not suitable).

War-Time Modifications

War-time Acts and Regulations give power to the Comptroller to allow a departure from the ordinary time limits if war circumstances have prevented the matters in question being carried out at the proper times. If it is considered expedient in the national interest, the publication of information in respect of an invention can be delayed or restricted; in these cases (*e.g.*, munitions of war) it is advisable (after sending application to the Patent Office) to submit the invention confidentially to the Government department concerned before the probable publication date, so that the invention can be kept secret. By so divulging information an application for a patent is not prejudiced. It may be added that before an application for a patent in a foreign country can be made, the authority of the Comptroller must be obtained.

If the application concerns a chemical invention, typical samples and specimens should ordinarily be delivered, or the Comptoller may require these to be provided. Where a graphic formula is used in the specification a copy must also be furnished. Special provisions apply to inventions relating to substances prepared or produced by chemical processes or intended for food or medicine. The specification is not to in-

clude claims for the substance itself except when produced or prepared by the methods or processes of manufacture particularly described and ascertained or by their obvious chemical equivalents. In relation to a substance intended for food or medicine, a mere admixture resulting only in the aggregation of the known properties of the ingredients of that substance does not constitute a method or process of manufacture (it will be remembered that a patent is only granted for an invention the subject matter of which is "a manner of new manufacture").

Personal Notes

MR. R. K. STRATFORD, chief chemist of the Imperial Oil Company, has been elected president of the Canadian Institute of Chemistry.

MR. C. J. BROCKBANK, who is already in control of abrasives and graphite in the Ministry of Supply, has been appointed Controller of Raw Asbestos in addition, starting from August 3.

The new president of the Canadian Chemical Association is DR. R. R. MCLAUGHLAN, F.C.I.C., of the chemical engineering department, Toronto University.

MR. E. J. BOAKE and MR. F. M. ROBERTS are retiring from the position of managing directors of A. Boake, Roberts & Co., Ltd. MR. F. G. PENTECOST has been appointed managing director, and MR. E. E. BOAKE, assistant managing director. Mr. E. J. Boake and Mr. F. M. Roberts will continue as chairman and vice-chairman respectively.

An account of war-time research in Britain was given at the annual meeting of the Industrial Research Institute of America by DR. G. S. WHITBY, who gave up the post as director of the Chemical Research Laboratory of the D.S.I.R. to become professor of rubber chemistry at the University of Akron.

The annual John Wesley Hyatt award of $1000 and a gold medal was recently presented to MR. FRANK H. SHAW, of the Shaw Insulator Co., by Dr. Frolich, president of the American Chemical Society. The award was made to Mr. Shaw for his work in perfecting the transfer moulding of thermosetting plastics which are used in shell fuses and the magnetos of military aircraft.

COMMANDER ARTHUR OWEN GILLETT, R.N., has been appointed a director of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE. Commander Gillett has been with the firm since 1928, and has been successively manager of the *British Trade Journal* and the *Hardware Trade Journal*. He has been on active service since the first day of the war.

DR. CLIFFORD B. PURVES, of the Massachusetts Institute of Technology, has been appointed E.B. Eddy Professor of Industrial and Cellulose Chemistry at McGill University, Montreal. Dr. Purves succeeds Professor Harold Hibbert, the first incumbent of the chair, who retires at the end of this month. Dr. Purves was born in Scotland in 1902 and received both his baccalaureate and doctor's degree from St. Andrew's University. After two years in the United States as a holder of the Commonwealth Fund Fellowship, he returned to Aberdeen University as assistant to the late Professor J. J. R. Macleod, but was later recalled to the United States where he took up a position at the National Institute of Health. In 1936 he was appointed associate professor of organic chemistry at "Boston Tech."

Obituary

MR. PERCY R. GOODWIN, whose death on August 5 has been announced, was secretary of Spencer, Chapman and Messel, Ltd.

MR. RICHARD WILLIAM TRENGOVE, who died at Erdington, Birmingham, on August 6, aged 65, after a long illness, was formerly manager of the British Aluminium Co., Ltd. (Midland Area).

MR. RALPH WAINWRIGHT, who died at Runcorn, Cheshire, recently at the age of 60, had spent the whole of his working career in the chemical industry, starting as an office boy at Wigg Works, Runcorn. Latterly he had been with I.C.I. at the Muspratt Works, Widnes, where he was appointed plant manager some years ago.

The University of Kansas chemist, DR. H. P. CADY, who developed the extraction of helium from natural gas in Kansas, died recently at the age of 68. His discovery of the presence of helium in natural gas at Dexter, Kansas, was made in 1907.

MR. STUART ANGUS, who died at Widnes on July 25, at the early age of 23, was employed as a research chemist at a Government research establishment, and was among the most promising students at Widnes Technical College. He was due to complete the examination for the Associateship of the Royal Institute of Chemistry only last week.

MR. HARRY MACKENZIE RIDGE, M.E. (Freiburg), M.Inst.M.M., M.I.Chem.E., F.Inst.F., died on August 4 at his home in London, aged 70. After qualifying as a metallurgist at Freiburg, he went to Australia, where in 1899 he became manager of an ore-treatment works at Broken Hill, New South Wales. From 1906 to 1909 he was technical adviser to the Sulphide Corporation, and at the same time general manager of the Central Zinc Company. From 1910 onwards he practised as a consultant chemi-

cal engineer and metallurgist in London. He had been a member of the Institution of Chemical Engineers for twenty years.

The well-known Midland industrialist, MR. ALFRED MILWARD REYNOLDS, died in his 74th year at his home at Alveston, near Stratford-on-Avon, on July 28. The son of a former Lord Mayor of Birmingham, he became chairman and managing director of John Reynolds & Sons, Ltd. He was a member of the council of Birmingham Chamber of Commerce and a guardian of the Assay Office. In an appreciation of the late Mr. Reynolds, Sir Robert Bird, M.P., writes: "He must be given a leading part in the creation of the era of light steel tubes and of ultra-light non-ferrous metals, chiefly aluminium and magnesium. To the problem (of perfecting methods of drawing steel tubes) he made a notable contribution by his invention of the reinforced or butted steel tube."

General News——From Week to Week

In the education debate in the House of Lords last week, Lord Winster said he hoped that the new proposals would help to provide more scientific and research workers.

Quartz crystal from Uganda is being tested in Britain for use in the radio industry, recent developments having made possible the utilisation of lower-grade crystal.

Fifteen new Fellows have been elected this month by the Board of the Institute of Physics. At the same time, 19 new Associates were elected, and 13 Subscribers and 10 Students admitted.

The British Association is considering the possibility of holding meetings in provincial centres. The secretary would be pleased to hear from any local organisation that would welcome a conference on some appropriate scientific topic in its own locality.

"New Uses for Glass" is the theme of an exhibition at the Kelvingrove Art Galleries, Glasgow. Among the exhibits is the dress of glass "silk" worn by the bride of Professor W. E. S. Turner, of Sheffield, at her wedding last month.

The history of coal-tar dyes is depicted, in colour, on a set of panels produced by the British Colour Council in co-operation with the gas industry, and formally presented to the education department of the Wrens by Sir David Milne-Watson.

The Stationery Office has published a supplement to the "Raw Materials Guide," giving particulars of the changes in the legal position with regard to the acquisition, sale and use of certain materials that have occurred since the Guide first appeared, together with references to the relevant Statutory Rules and Orders.

More lime and phosphates are needed for Scottish farms, said Dr. W. G. Ogg at the farewell luncheon given him last week by the Aberdeen Chamber of Commerce. He added that grinding equipment was now being provided to take advantage of the abundant deposits of limestone in Aberdeenshire and Banffshire.

Messrs. L. Oertling, Ltd., who have been occupying temporary premises since the "blitz," announce their return to Central London. From August 22 the address will be 110 Gloucester Place, Portman Square, London, W.1. (Tel.: WELbeck 2273/4.)

In respect of the period beginning September 3 and ending December 2, 1943, the rate of premium payable under any policy issued under the Commodity Insurance Scheme will continue to be at the rate of 2s. 6d. per cent. per month.

An exhibition illustrating the saving of raw materials in the production of munitions of war, organised by Sir Vyvyan Board, senior economy officer of the Ministry of Supply, is on view in the Horticultural Hall, Westminster, to all who are vitally concerned in production, whether as directors or managers, or as leaders of labour. It is not open to the general public.

Over 600,000 fibreboard cases are collected weekly for re-use in industry by the Container Recovery Service. This non-profit-making organisation was set up two months after the outbreak of war in order to ensure the continued re-use of containers which were obviously going to be in short supply as the war progressed. Wood boxes, sacks and iron drums also come under the collection scheme.

Soil chemists investigating mineral deficiencies will find a valuable aid in "The Diagnosis of Mineral Deficiencies in Plants," by Dr. T. Wallace, A.I.C., of Long Ashton Research Station (Stationery Office, 10s.). It contains a colour atlas and guide, together with 114 photographs in colour showing the characteristic effects produced in plants by the lack of different minerals.

Shortage of tanning materials imported from abroad is given by Mr. Bernard H. Harvey, chairman of the United Tanners' Federation, as one reason why the public has to put up with inferior leather on footwear. In his statement to the Press he also explains that a considerable quantity of imported leather has to be distributed without being re-tanned.

Organo-mercury dressings are now being used by an increasing number of farmers for wheat, barley and oats, but, according to W. A. R. Dillon Weston and R. Eric Taylor, of the Cambridge School of Agriculture, writing in *Nature*, the majority do not realise the value of such dressings for rye, which also is liable to attack by seedborne fungi.

Foreign News

In Cuba, 5,000,000 litres of alcohol a month are used in the manufacture of motor fuel.—

An Ulster linen factory is experimenting with the weaving of fabrics from glass fibres.

A new plant producing liquid chlorine, has been put into production by South African Pulp and Paper Industries, Ltd.

A substitute lubricant is being made from Malayan palm or coconut oil and lime, reports the Japanese radio.

All pyrethrum grown in Nyasaland has to be sold to the Government at prices fixed by the Ministry of Supply.

A factory for the production of sodium and potassium silicate has been established at Falkenberg, Sweden.

Producer-gas units using cotton stalks have been perfected by the agricultural mechanisation station of the Uzbekistan Scientific Research Institute, U.S.S.R.

Alcohol from beet is being produced in a plant at Port Lyautey, Morocco, which has handled 400 tons of fresh beet in the past year.

Two Brazilian factories are daily turning out 40 " gasogenios " (gas-producer units) for motor vehicles in order to meet the petrol shortage.

Output of industrial alcohol by Canada is estimated to reach 7,500,000 gallons this year, reports the Department of Munitions and Supply.

The Ungarische Oelwerke A.-G. has been established in Budapest for the production of vegetable edible oils and also for the refinery of coal distillates.

Deposits of muscovite mica found at Eau Claire, near Mattawan, Ontario, are said to constitute the most important mica discovery in North America since the war began.

Importation to Sweden of graphite crucibles, silver, silver nitrate and soda ash is now under State control and subject to permits being obtained from the Industrial Commission.

Mr. Henry Ford, the motor millionaire, is having a cabin erected in memory of the coloured chemist, George Washington Carver, who died last year. Four pieces of wood from England, Scotland, Wales and Ireland are to be incorporated into the memorial and these are already on their way to America.

Plastic nozzles for fire hose are being marketed by a Chicago firm.

For glycerine production, Canada aims to salvage 35 million pounds of fat this year.

A promising deposit of mercury has been found in the Kalpitiya district of Ceylon.

Increased crops of oilseeds in Switzerland last year included 1300 acres of rapeseed and 1700 acres of poppy seed.

The Brazilian Government has fixed prices for cotton by-products, such as cotton-seed, for refined edible cotton-seed oil, and for cake or meal for use as cattle-feed or as fertiliser.

Chemically-teated wood chips are being used as the basis of a German ersatz "meat," according to the European Press. Development of this process is credited to a former Nobel prizewinner, presumably Bergius.

The Spanish Empresa Electro-Mecanica de Cordoba is building a new plant for 8000 tons of aluminium p.a., which the Soc. General Española de Aluminia, S.A., is raising its production to 2000 tons yearly.

A synthetic-rubber plant is being built near Sofia, Bulgaria. Production is expected to begin at the rate of one ton a day, rising to 500 tons a year. Present Bulgarian production is reported to be 2 cwt. a day.

Ammonium sulphate plants to produce 110,000 tons a year are to be erected in Portugal at a cost of £3,000,000 by the Companhia Uniao Fabril, Sociedade Portuguesa de Azote and Empreza Amoniaco Portuguesa.

A recent survey of the bauxite deposits in the Manica district of Mozambique shows reserves of 2,400,000 tons, of which, however, only 68,000 tons are available for immediate exploitation. Most of the bauxite is exported for conversion into aluminium sulphate.

Trial plantings of pyrethrum are being made in Australia under the direction of the Council of Scientific and Industrial Research. The seeds were imported from Kenya, where the war has led to development of this source of insecticide.

Canada's sales of medicinals and pharmaceuticals, including fine chemicals, were considerably greater last year than in any previous annual period. Output was valued at $40,900,000, or 16 per cent. more than in 1941.

A new tin-smelting plant in Spain, with a daily output of 2-3 tons, has been started by the Soc. Minera y Metalúrgica de Peñarroya, and a plant for flotation of copper ores by the Soc. Española de Construcciones Electromecánicas in Bilbao.

American metallurgists of the Bureau of Mines are engaged in research to develop a low-cost process for extracting magnesium oxide from olivine, with the aim of making this material a source of magnesium metal for war production.

Dynamit Nobel reports that a new sulphuric acid factory and the new extension of the carbon disulphide plant have been put in operation at the Bratislava works in Slovakia. Insecticides are now being produced on an increased scale.

Potash salts are now being prepared in Australia on a commercial scale at a large cement works. Formerly potash was imported, mainly from Germany, but it is expected that the home-produced salts will be able to compete after the war with imported materials.

American plants are turning out more magnesium than is needed, states *Chemical Industries*, so the Government has cut the production of the sea-water factories by 25 per cent. No reduction has been ordered, however, at plants making the metal from ores.

Enemy-owned companies in America to the number of 285 are to be auctioned by the Alien Property Custodian. They include: General Aniline Film Corporation, American Bosch Corporation, Buffalo Electric Chemical Corporation, the Schering Corporation, and American Potash and Chemical.

The use of silver by over 200 American firms is being investigated by a team of War Production Board examiners to see how far industry is complying with war-time regulations. The survey is being made because of the increasing substitution of silver for scarcer materials in war production.

The U.S. Bureau of Mines has published a useful report on the various kinds of synthetic rubber, giving the names of their manufacturers, the methods of production, the characteristics of the finished products, and a bibliography. The publication, Information Circular No. 7242, can be obtained from the Bureau, Department of the Interior, Washington, D.C.

Production of artificial fertilisers in Sweden has now a capacity of about 18,500 tons p.a. in nitrogen content, while in 1939 only 9075 tons were produced. Synthetic nitrogen fertilisers are only produced by the Stockholm Superfosfat A.-B., founded 1871; ammonium sulphate and nitrate in Ljungaverk and calcium cyanamide since 1941 at Alby and Sundsvall with a yearly future capacity of 40,000 tons.

The Hungarian Fertiliser, Sulphuric Acid and Chemical Industry Company, Budapest, has built large soda works production from which will satisfy the whole soda demand of Hungary. At the same time, the State-owned Iron, Steel, and Machinery Company, Budapest, has established a new branch for the production of magnesium and its alloys, which so far have had to be imported. The plant will be worked under an I.G patent process.

Factories in Occupied Europe are receiving from the Germans extremely detailed questionnaires asking for details of trade secrets and manufacturing processes, and these are accompanied with the threat that if such information is withheld German experts will visit the works and make their own investigations.

Forthcoming Events

The annual general meeting of the Midland section of the **Institution of the Rubber Industry** will be held on **August 23.** The proceeding will be followed by a film show.

The Association of British Chemical Manufacturers, with the co-operation of the **British Chemical Plant Manufacturers' Association,** is organising a series of discussions on the practical aspects of the utilisation of fuel and power in chemical processes. The next in the series will be held at the College of Technology, Whitworth Street, Manchester, at 5 p.m., on **August 25.** The subjects will be "Heating by Liquids" and "Heat Exchangers (including the Use of Effluents)." Brief introductions by Mr. B. N. Reavell and Mr. H. F. Goodman, respectively, will be followed by discussions and questions. Non-members will be welcome and should notify Mr. W. Murray (The Liverpool Borax Co., Ltd., Maxwell House, 6 St. Paul's Square, Liverpool, 3), not later than August 21, of their attention to attend.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

LIME SUPPLIES, LTD., St. Albans. (M., 14/8/43.) July 22, two assignments securing to Barclays Bank, Ltd., all moneys due or to become due to the Bank; charged on moneys under contracts.

Satisfaction

NATIONAL GALVANIZERS, LTD., Sunderland. (M.S., 14/8/43.) Satisfaction July 14, £10,000, registered October 26, 1923, and unissued balance of £2000 cancelled.

Companies Winding-up Voluntarily

POLARIZATION PRODUCTS, LTD. (C.W.U.V., 14/8/43.) By special resolution passed July 22. T. Stromwell, 39 Lombard Street, London, E.C.3, appointed liquidator.

THE SAXON CHEMICAL COMPANY, LTD. (C.W.U.V., 14/8/43.) By special resolution passed July 24. Thomas Schofield Smith, 8 Manchester Road, Bury, appointed liquidator.

Company News

The Standard Chemical Company, Ltd., of Canada, reports a net profit of $55,250 ($122,873) and is paying a dividend of $1.25 a share (same).

The Egyptian Salt and Soda Co., Ltd., has increased its nominal capital by the addition of £540,000, in £1 ordinary shares, beyond the registered capital of £720,000.

International Bitumen Emulsions, Ltd., are paying no further dividend for the year ended March 31, making 6 per cent. (same) for the year.

Cellactite and British Uralite, Ltd., report a net profit, for the year ended March 31, of £8679 (£7557), and are paying a dividend of 10 per cent. (nil).

Benzol and By-Products, Ltd., announce a dividend of 6 per cent. on cumulative participating preference shares, being arrears for one year to September 30, 1933, payable September 30, 1943.

New Companies Registered

Albo Drum Cleaning Company, Ltd. (381,797).—Private company. Capital: £100 in 100 shares of £1 each. Washers, cleaners, and renovators of metal drums and containers, chemical manufacturers, etc. Directors: J. Fitzgerald; E. V. Vidgen. Registered office: Stour Road, Old Ford, E.3.

British Disinfectant Co., Ltd. (381,891).—Private company. Capital: £10,000 in 10,000 shares of £1 each. Manufacturers of and dealers in disinfectants, antiseptics, pest-control products, etc. Directors: L. T. Edwards; Elsie V. Edwards. Registered office: South Grove, S. Tottenham, N.15.

W. P. D. Company, Ltd. (382,075).—Private company. Capital: £100 in 1000 founders' and 1000 ordinary shares of 1s. each. Research engineers, research chemists, etc. Subscribers: Dr. Evan W. R. Williams; Sir Walter Peacock, K.C.V.O. Solicitors: F. C. Green and Son, 29-31 Portugal Street, W.C.2.

Uverex Holdings, Ltd. (381,982).—Private company. Capital: £100 in 2000 shares of 1s. each. Agents and brokers of inventors and others, manufacturers of and dealers in fire appliances, chemicals, drugs, etc. Subscribers: E. J. Heinz, 29 Park View Gardens, N.W.4; G. F. Sexton; P. Chrobox.

Pulmer Water Lime Co., Ltd. (382,046).—Private company. Capital: £1000 in 1000 shares of £1 each. Converters of chalk into ground carbonate of lime for agricultural and other purposes, lime hydrators and burners, manufacturers of and dealers in lime washes, quarry and kiln owners, etc. Directors: L. T. Sprosen; L. L. Weir. Registered office: Waterloo Chambers, Chelmsford, Essex.

Chemical and Allied Stocks and Shares

STOCK EXCHANGE markets have been less active than was the case last week, but the general undertone remained buoyant. There was, however, a little profit-taking in industrial shares which recently advanced strongly in price on hopeful views as to the post-war outlook. Nevertheless, the rather lower prices as compared with a week ago were attributed in a large measure to absence of further expansion in demand. It is realised that, in many cases, yields on the basis of current dividends are small, and that there is very limited scope for early improvement in dividends. Moreover, the dividend outlook for many shares will turn on whether there is an early abolition of 100 per cent. E.P.T. after the war.

A steady feature was again provided by Imperial Chemical, which at 39s. 3d. were virtually the same as a week ago. Moreover, B. Laporte ordinary were again quoted at 78s.; this company has been able to report considerable expansion in trading profits during the war, but this has not been reflected in net profits which, in fact, have been at a rather lower level owing to the weight of taxation. Nevertheless, despite increased capital issue, the dividend has been 15 per cent. since 1939-40, and this has been a conservative payment. In respect of the financial year ended March 31 last, a further 17 per cent. could have been paid if profits had been distributed up to the hilt.

Borax Consolidated at 36s. showed a further small gain over last week, but there was a small reaction to 49s. 6d. in British Aluminium, and in British Oxygen to 76s. 6d. Following recent gains, Barry & Staines reacted to 43s. 6d., while Associated Cement were 64s. 9d., compared with 66s. 9d. a week ago. On the other hand, Imperial Smelting further improved from 15s. 1½d. to 16s. 1½d., and Lever & Unilever at 37s. 3d. were 9d. higher on balance. General Refractories were further improved to 16s. 9d., and British Match were again quoted at 39s. 6d. Elsewhere, the units of the Distillers Co. were 87s. 3d., and United Molasses 31s. Turner & Newall have made further improvement to 80s. at the time of writing, compared with 79s. 3d. a week ago. Triplex Glass 10s. ordinary was another share which reflected market hopes that after the war dividends may return to the

pre-1939 level, and at 36s. 7½d. more than held the rise recorded a week ago.

At 42s. Wall Paper Manufacturers deferred units more than held their recent advance. Moreover, at 19s. 9d. Amalgamated Metal were better on balance. In other directions, dealings up to 52s. were recorded in Fisons ordinary; at 7s. 6d. in Greeff-Chemicals 5s. ordinary; and up to 18s. 3d. in Leeds Fireclay preference shares. International Paint were higher at 120s., and Lewis Berger ordinary changed hands around 96s. Thomas De La Rue were inclined to fluctuate, but at £7¾ regained part of an earlier decline, although their position contrasted with £7⅞ a week ago. Among other shares of companies associated with plastics, Erinoid 5s. ordinary were around 12s. 3d. British Industrial Plastics 2s. ordinary were better at 6s. 1½d., partly on the news of an agreement with Elliotts and Australian Drug Proprietary, under which a company called Beetle Elliott Proprietary is to be formed for the manufacture and sale in Australia of Beetle resins and moulding powders. British Celanese were 31s. 6d., and Courtaulds 55s. 3d.

Among iron, steel and kindred shares Stewarts & Lloyds were 52s., Tube Investments 91s. 9d., Guest Keen 32s. 9d., Staveley 53s. 9d., and United Steel 25s. Dunlop Rubber at 39s. 6d. were slightly higher on balance, and Metal Box Ordinary shares, which remained under the influence of satisfaction from the financial results, were 94s. 7½d. Gas Light & Coke ordinary showed improvement to 19s. 10½d. owing to the prospect of further consideration of the resumption of interim dividend payments. Boots Drug 5s. ordinary were 43s., compared with 42s. 6d. a week ago. Oil shares recorded further improvement on balance, and Anglo-Iranian were in strong demand at one time, but best prices reached in the past few days were not fully maintained.

British Chemical Prices

Market Reports

A QUIET trade is reported from most departments of the general chemicals market in London, and new bookings are on a smaller scale than of late, chiefly due to holiday conditions which have also affected the delivery against contracts. Pronounced firmness in virtually all sections remains an outstanding feature of the trade, but no actual price changes fall to be recorded. Supplies of bicarbonate of soda, soda ash, Glauber salt, and salt cake are being taken up fairly satisfactorily on the basis of recent levels, while a steady movement of caustic soda has been reported. Acetate of soda is well held, with a moderate weight of new business being transacted. With regard to chlorate of soda, offers are still relatively tight and a strong undertone is reported. Outputs of British-made permanganate of potash are being well absorbed, and substantial orders are held Other potash chemicals are in short supply, especially solid caustic, bichromate, and yellow prussiate, and a sustained demand continues for these materials, while fresh inquiries have been dealt with for acid phosphate of potash. In other directions a brisk movement of supplies of sulphur and carbide of calcium continues, while glycerine is likewise a brisk section of the trade. White powdered arsenic remains firm, and a good demand is reported for formaldehyde. Quiet conditions are in evidence in the market for coal-tar products this week. Fair quantities of pitch are being absorbed, and there is a ready outlet for creosote oil and the anthracene oils. A steady demand is reported for the toluols, benzols, and xylols.

MANCHESTER.—Chemical traders on the Manchester market during the past week have continued to report comparatively slow conditions due largely to holidays in the district, though there is a generally steady movement of supplies of soda compounds and other leading "heavies" to those consuming works not actually affected by holiday stoppages. There is no doubt, however, that seasonal conditions have left their mark both on the aggregate volume of contract deliveries and on the amount of new business; a little expansion in this respect is looked for before the end of the month. Throughout the market firmness of prices is strongly in evidence. With regard to the by-products, new business locally is not extensive, but supplies of most classes, both light and heavy, are being well absorbed.

GLASGOW.—In the Scottish heavy chemical trade there is no change during the past week, home business maintaining its steady day-to-day transactions, while export trade is rather restricted. Prices remain very firm.

Second-hand
MIXING PLANT
for sale.

VERTICAL totally enclosed Mild Steel STEAM JACKETED MIXER, 6 ft. 0 in. dia. by 8 ft. 6 in. deep; dished bottom and bolted-on dished cover; fitted vertical glanded agitating shaft overdriven through gearing from f. & l. pulleys; two sets of internal steam coils, manhole, sundry connections, etc.

Vertical totally enclosed Mild Steel STEAM JACKETED MIXER, 4 ft. 3 in. dia. by 6 ft. 6 in. deep; vertical glanded agitating shaft overdriven through gearing from f. & l. pulleys; mounted on supporting feet and provided with manhole and sundry connections.

Vertical Copper STEAM JACKETED MIXER, with copper pan 3 ft. 0 in. dia. by 2 ft. 0 in. deep, fitted bow and scraper mixing gear overdriven through bevel and spur gearing from f. & l. pulleys; mechanically operated rise and fall mechanism.

Horizontal Mild Steel "U" shaped UN-JACKETED TROUGH MIXER, 13 ft. 6 in. long by 2 ft. 5 in. wide by 2 ft. 10 in. deep; horizontal agitating shaft driven through gearing from f. & l. pulleys; trough arranged with two discharge openings, fitted sliding doors.

Horizontal MIXER by Baker Perkins, with mild steel tilting "U" shaped pan, 3 ft. 3 in. by 2 ft. 6 in. by 2 ft. 0 in. deep, arranged with double scroll type blades driven through gearing from f. & l. pulleys; power operated tilting mechanism and reversing clutch.

Horizontal Drum type MIXER by Russell & Co.; mild steel drum 2 ft. 11 in. dia. by 1 ft. 9 in. wide; mounted on cast iron stand; driven through gearing from f. & l. pulleys; drum fitted quick release cover and hand-operated brake.

GEORGE COHEN, SONS & CO., LTD.,
STANNINGLEY, near LEEDS, and
WOOD LANE, LONDON, W.12.

ANALYTICAL BALANCES—immediate delivery for work of National importance, various models available. J. W. TOWERS & CO., LTD., Widnes.

WANTED

WANTED.—Supplies of Nitre-Cake in ten ton lots. Box No. 2126, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

ROTARY FILTER in good condition. Reply Box No. 2129, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

WANTED to purchase CHEMICAL AGE from 1936 to 1942. WM. DAWSON & SONS, LIMITED, 43 Weymouth Street, London, W.1.

SERVICING

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers' Valuers and Fire Loss Assessors of
CHEMICAL WORKS, PLANT AND MACHINERY,
York House, 12 York Street, Manchester.

Telephone: 1937 (2 lines) Central, Manchester
Telegrams: "Russoken," Manchester.

PATENTS & TRADE MARKS

NOTICE is hereby given that Fraser & Fraser, Limited, and Max Heller seek leave to amend the Specification of the Application for Letters Patent No. 553,319 entitled "Improvements relating to apparatus for degreasing non-porous articles."

Particulars of the proposed amendment were set forth in the Official Journal (Patents) No. 2843 dated July 21st, 1943.

Any person may give Notice of Opposition to the amendment by leaving Patents Form No. 19 at the Patent Office, 25 Southampton Buildings, London, W.C.2, on or before the 21st August, 1943.

WORKING NOTICE

THE Owners of British Patents No. 413,923 relating to "improvements in process of treating vegetable oils and product obtained thereby," and No. 469,808 relating to "improvements in and relating to centrifugal separation of materials" are desirous of entering into negotiations with one or more firms in Great Britain for the purpose of exploiting the inventions either by sale of the Patent rights or by the grant of Licences on reasonable terms. Interested parties who desire further particulars should apply to Albert L. Mond & Thiemann, of 14-18 Holborn, London, E.C.1.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

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